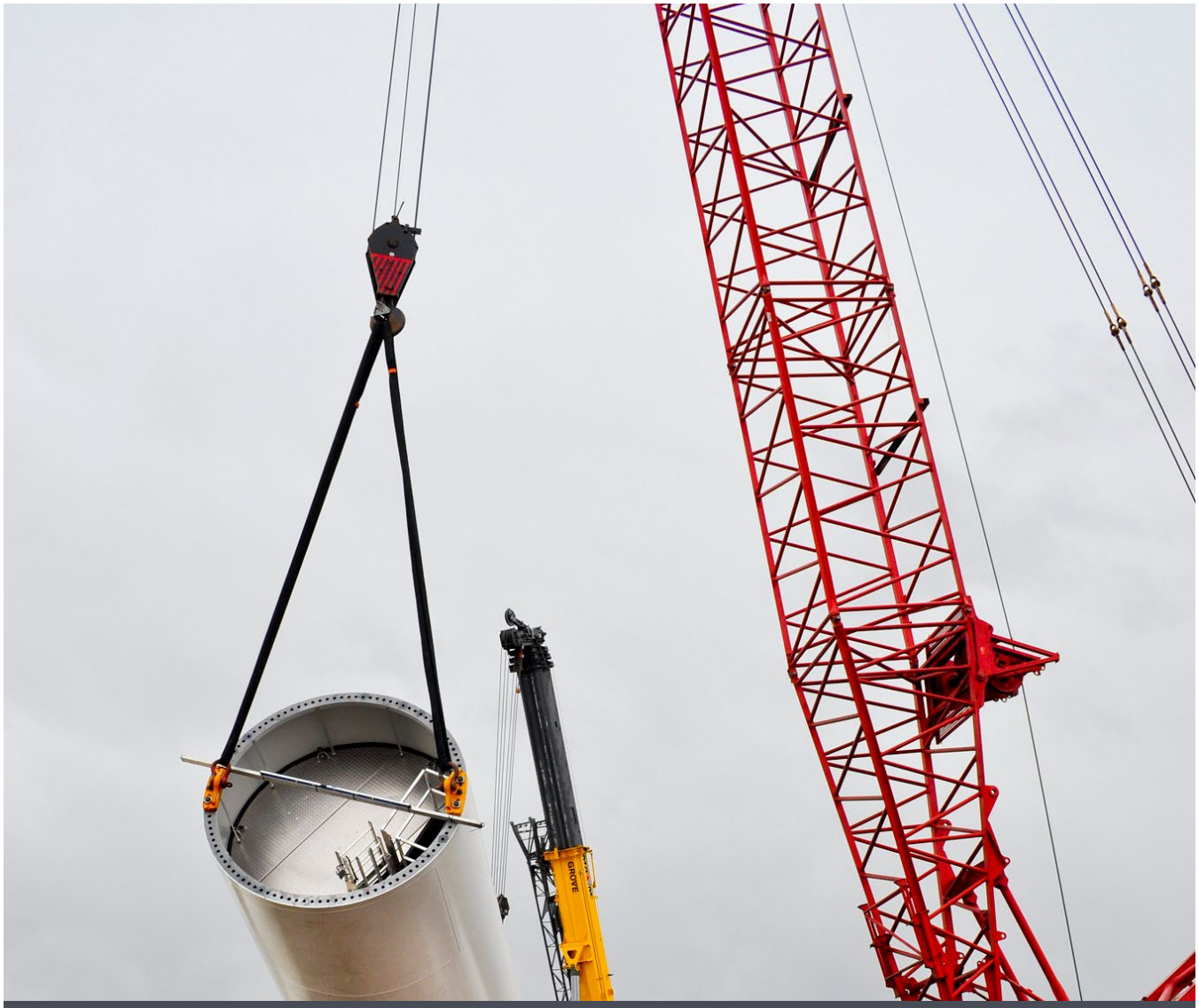

5 Incremental Cost

Chapter Five: Cost

Calculation of Incremental Cost

WAC 480-100-640(7) requires we calculate and include the incremental cost of achieving the 2030 carbon-neutral and 2045 clean energy targets. We determined the incremental cost by comparing the costs to a hypothetical portfolio of activities that a utility would have pursued in the absence of these targets. To be included in the projected incremental cost calculation, the cost must be incurred during the 2022–2025 period, be directly attributable to activities that move the utility toward compliance with the 2030 and 2045 targets and not be required by other statutes. This section outlines how we identified these incremental activities and how we calculated the projected associated costs.

Investments in Transitioning to Clean Energy

Achieving the specific targets and other requirements to meet CETA's 2030 and 2045 goals requires a wide range of actions and investments. These actions range from developing renewable energy resources to grid modernization to customer education.

PSE considers the costs of achieving CETA's targets as groupings of related investments, each supporting different associated activities designed to achieve the goals of the act. These investment categories include resources, delivery systems, operations, technology, and customer and administrative costs. The table below lists the primary types of systems and examples of the kind of investments needed to support the changing resource mix required under CETA.

Table 5-1: Investments Categories

Investment Category	Examples of Specific Investments
Resources	• Energy efficiency program development, operation, and customer incentives • Demand Response Program development, operation, and customer incentives • Power Purchase Agreements for renewable energy or emissions-free capacity • Purchase renewable resources of emission-free capacity sources • Operations of energy resources, including large scale and distributed resources
Resource Enablement and Delivery	• Distributed Energy Resource design actions and tools • Transmission capacity to deliver new resources • Grid modernization to support distributed energy resources • Grid operations to incorporate distributed energy resources • Operations of distributed energy resources
Customer Education and Engagement	• Detailed program design and customer enrollment • Customer education and engagement on the clean energy transition
Administration and Monitoring	• Measuring customer benefit indicators • Tracking and reporting

The investment profile we need to achieve the clean energy goals will change over time. For example, in this Clean Energy Implementation Plan (CEIP), PSE required no investments in energy transformation projects. Investment needs, however, may change in future Clean Energy Implementation Plans.

Specific Costs for the Transition to Clean Energy

From 2022–2025, a connected set of investments will allow PSE to meet the specific and interim CETA targets and ensure we achieve customer benefits in the process. This section discusses the costs for the 2022–2025 period within each investment category.

Resource Costs

Between 2022 and 2025, we will add utility-scale and distributed energy resources to PSE's power supply portfolio to add renewable energy supplies, battery energy storage, demand response, and energy efficiency.

Energy Efficiency: A low-cost resource, energy efficiency is a core component of PSE's energy supply portfolio. PSE provides energy efficiency programs across all customer types, based on the targets established through the conservation potential assessment in the IRP, an energy efficiency RFP, and oversight by the Conservation Resources Advisory Group. Programs operate in two-year cycles, with the 2022–2023 biennial cycle aligned with the first two years of the Clean Energy Implementation Plan. PSE's electric savings target for 2022-2023 is 505,448 MWh and the budget is $202M. This budget is based on the energy efficiency 2021 request for proposal and PSE's experience with existing programs to develop the total cost estimate to reach our energy savings targets. We provide more information on energy efficiency costs in Appendix F1.

Demand Response: We base the forecast costs of demand response resources included in the CEIP on the cost estimates in the IRP, which are detailed in Appendix J and Summarized in Appendix F2. To refine these costs and forecast programs, PSE will issue an RFP for distributed energy resources and demand response in early 2022. We will incorporate the actual costs of programs proposed in the RFP process as the CEIP unfolds and into a cost forecast when we update the CEIP in 2023.

Renewable Energy: A wide range of activities contribute renewable energy to PSE's energy supply portfolio, as we discuss in Chapter 5. We have not identified specific renewable energy resources in this CEIP. We will pinpoint these resources when we review the results of the 2021 All-source, the 2022 distributed energy resource, and demand response RFPs.

To develop this CEIP, PSE used several sources of cost data for renewable energy programs. For large-scale generating resources, we used the generic resource costs from the 2021 IRP, which are included in Appendix F3. For distributed energy resources, PSE commissioned more program-specific cost estimates from Black & Veatch that fully captured the costs of resources and program operations. We include these program-level cost estimates in Appendix K. We will identify updated costs when we choose specific resources and programs from the 2021 All-Source and the 2022 distributed energy

resource and demand response RFPs. We will incorporate these selected resources and their associated resource and program costs in the 2023 IRP and 2023 CEIP updates.

To identify the combined costs of specific portfolios of resources, PSE used the AURORA model, which was updated to incorporate the more specific distributed energy resource costs.

Energy Storage Resources: PSE commissioned Black & Veatch to complete a study of equipment and program costs for distributed energy storage resources to provide a current view of the total anticipated costs of a mix of utility-owned and customer-owned energy storage resources. Based on their mix, we fed the costs of these programs into the AURORA modeling to calculate their part of the overall energy supply portfolio. We detail the costs of these resources and the program costs in Appendix E. We will identify updated costs when we select specific resources and programs from the responses to our 2021 All-Source RFP and the 2022 distributed energy resource and demand response RFPs. We will incorporate these selected resources and their associated resource and program costs in the 2023 IRP and 2023 CEIP updates.

Resource Enablement and Delivery

DER Enabling Systems: In Chapter 4 we describe how we will sequence enabling strategies, tools, and functions so PSE can effectively operate distributed energy resources at scale. This process includes systems to operate and implement distributed energy resources.

Transmission: During this Clean Energy Implementation Plan, PSE may acquire additional transmission rights to deliver utility-scale resources to our electric service territory. We may also use our existing transmission rights to support the delivery of new renewable resources. In the 2021 All-Source RFP, PSE specifically sought renewable resources that meet both scenarios. To estimate costs in this CEIP, PSE continues to rely on the transmission costs used in the 2021 IRP. As we select specific resources through the 2021 All-Source and 2022 distributed energy resource and demand response RFPs process, we will detail revised costs in the 2023 IRP and CEIP updates.

Grid Modernization Costs

There are a handful of tools and programs that PSE will discuss in the context of incremental costs for CETA as they are key enablers accelerated to keep pace with the preferred portfolio and processes envisioned in the CEAP. The clean energy action plan based on the 2021 IRP preferred portfolio identified a significant number of DERs needed by 2030. In total, 634 MW of distributed batteries, solar and demand response are needed within PSE's service territory by 2030. This is over 10 times the amount of DERs than the grid has accommodated over the last 4 years, a total of 52 MW. PSE's grid modernization investments were keeping pace with the economic driven customer adoption of DERs across the grid, the pace of DERs driven specifically by the CETA law and resulting policies necessitate a reset on some programs.

This CEIP sets specific distributed energy resource targets in Chapter 2 and outlines related grid modernization activities in Chapter 4. These related grid modernization activities are only one small part

of PSE's overall grid modernization strategy. More details of the grid modernization strategy are included in Appendix G.

To accommodate the rapid increase in DERs the grid needs to support over the next 10 years, portions of the grid modernization investments need to be accelerated to match that pace. The overall target over the next five years is to enable 5 percent of (~55) distribution circuits to be fully ready to support high penetrations of DERs in the range of 2-5MW per circuit. To ensure the grid can support this while continuing to deliver reliable and resilient power to customers, we accelerated specific investments and identified new ones. This included:

- Enhancing the SCADA system equipment at substations to support DER high penetration circuits, increasing work plan by over 60 percent over historical pace.
- Enhancing circuit visibility and control by installing additional voltage regulation and automated circuit switching equipment on DER high penetration circuits, 100 percent of this work plan added to address the consequences of this penetration.
- Enhancing access to gathered data to drive analysis and process that span many operational tools and investment decisions, increasing focus by over 50 percent. Enhancing resilience focused on proactive high risk grid monitoring and associated DER microgrid installations to enable alternate sources of power for customers experiencing limited grid flexibility, increasing work plan by over 70 percent to focus more aggressively on these valuable customer benefits.
- Proactive DER property acquisition adjacent to existing substation facilities that can enable lower cost interconnection for DERs while maximizing benefits to the system while incorporating equity consideration and increasing work plan by over 10 percent to incorporate proactive expansion.

Additionally, PSE focused on tools that are just now being developed, recognizing tools like ADMS will be foundational as we progress toward clean energy. It is important to recognize that the investment in grid modernization in its entirety is needed for successful transition irrespective of whether work occurred before the effective date of the CETA or whether it facilitates additional benefits not specifically envisioned by CETA. For example, transmission capacity investments in compliance with the NERC Reliability Standards are required to deliver the increased load and provide the flexibility and reliability that will be needed with the proliferation of DERs and electric vehicles, power must still flow, and those transmission and distribution lines must be reliable. These investments are intentionally not included in the incremental costs for CETA but should not be assumed unnecessary by any stretch. PSE's 2021 IRP, Chapter 8 and Appendix M, recognized the important investments in the grid to enable this transition and avoid reactive expenditures to accommodate unanticipated growth in distributed energy resources[42]. The CEAP reaffirms the 10-year plan for the deliverability of

[42] RCW 19.280.100(2)(e)

resources[43]. PSE's entire grid modernization investments drive progress in visibility, analysis, and control; reliability and resiliency; DER integration processes; security, cybersecurity, and privacy; and backbone infrastructure.

PSE's CEIP must consider these foundational investments, and sustain and advance programs and plans associated with PSE's entire grid modernization investments. The CEIP is mindful of the risk to clean energy delivery if the overall grid modernization approach is not on track, even though a small part of it is included in the actions in this CEIP.

Customer Management Costs

Implementation of CETA requires a range of customer programs and administrative functions.

Customer Education and Engagement. As we developed this CEIP, stakeholder and customer feedback focused on the need for customer education. CETA also requires ongoing customer engagement with all customers and members of highly impacted communities and vulnerable populations through education about clean energy. We include PSE's public participation plan as Appendix C. We detail cost estimates for the work in Appendix E.

Monitoring and Reporting. Implementing CETA includes several critical administrative activities, including tracking progress toward energy goals, the performance of customer benefit indicators, tracking costs, and reporting. We developed a forecast of the costs of these activities based on our experience with other programs and included it in Appendix E.

Directly attributable activities

We identify activities directly attributable to pursuing the 2030 and 2045 standards based on those necessary to support the 2022–2025 Clean Energy Action Plan. These activities are consistent with the conditions described in WAC 480-100-640 (3).

Some activities and costs are necessary due solely to 2030 and 2045 standards, and some are increased or accelerated to meet the 2030 or 2045 standards.

To identify incremental activities, PSE compared the energy resource portfolios included in this CEIP to a generic resource portfolio that AURORA selected without CETA but included the social cost of greenhouse gases in the portfolio selection to identify what is incremental. We provide the coming 10-year summary of these portfolios below.

Activities that relate to implementing the resource portfolio in this CEIP include those from all investment categories. Many activities are driven by CETA, such as a significant increase in renewable energy acquisition, whereas others were already part of the non-CETA portfolio, but we increased them due to CETA. An example is energy efficiency. The portfolio without CETA included energy efficiency, but when we added the requirements of CETA, we gained significantly more energy efficiency.

[43] IRP; pg 2-20

Incremental Cost

We developed the incremental costs from the incremental activities and the overall costs to implement CETA. We considered all costs incremental for those activities driven solely by the requirements to meet the 2030 and 2045 standards. We allocated costs based on the higher activity for those accelerated activities to meet the 2030 and 2045 standards.

Here we describe how we calculated the incremental cost for each CETA-related investment contributing to the incremental cost.

This section includes the terminology "baseline portfolio" and "CEIP portfolio." A baseline portfolio[44] is the portfolio of generic resources that do not have the requirement to meet the energy and carbon content requirements of CETA but do include the social cost of carbon. The CEIP portfolio is the portfolio in this Clean Energy Implementation Plan that takes into account for the need to meet CETA and the social cost of greenhouse gases.

Resource Costs

Energy Efficiency: We calculated incremental costs based on the average cost of savings in the draft 2022-2023 Biennial Conservation Plan and applied them to the ratio of the amount of energy efficiency in the baseline portfolio and the CEIP portfolio to calculate the incremental cost of the CEIP portfolio above the baseline portfolio.

Demand Response: We calculated incremental costs based on the difference between program costs for the demand response amounts in the baseline and CEIP portfolios. We based these costs on the generic program costs and costs included in the conservation potential assessment in the Integrated Resource Plan.

Energy Supply Portfolio, including Generation Resources and Storage: We calculated incremental costs based on the difference between the generation portion of the baseline and the CEIP portfolio. We isolated the generation costs by providing an AURORA capacity expansion and dispatch of the baseline portfolio, but with the energy efficiency and demand response amounts held at the same amount in the CEIP and baseline portfolios. This method allowed us to consider only the difference in generation costs between the two portfolios. This approach isolated the changes in energy supply cost from any changes in energy efficiency and demand response.

Resource Enablement and Delivery Costs

DER Enablers*:* We allocated DER enabling costs to incremental cost based on the increased targets for distributed energy resources and demand response, compared to the baseline portfolio. PSE will

[44] The baseline portfolio is the same as the alternative lowest reasonable cost portfolio. PSE used a portfolio optimization model as basis for calculating the alternative lowest reasonable cost portfolio to show the difference in portfolio choices and investment needs. [WAC 480-100-660(1) and (4)(c)]

use many of these systems beyond 2022–2025, so we based our cost estimate on the incremental amount of these resources over 10 years.

Transmission*:* We include incremental transmission costs in the energy supply portfolio calculation, as the assumed transmission costs are part of the resource costs. We include the generic transmission estimates used in the 2021 IRP in the resource costs for this projection.

Grid Modernization*:* We will incur significant incremental grid modernization costs to support the much higher amounts of DER in the CEIP portfolio than the baseline portfolio.

Customer Education and Engagement Costs

CETA creates significant new requirements for customer education and engagement to support customer benefit indicators[45], in the development of the Clean Energy Implementation Plan[46], implementation of the plan[47], and through customer notices[48]. This work should also seek input from highly impacted communities and vulnerable populations and remove barriers to participation in clean energy planning and implementation.

PSE's work in this area is tied to developing the Clean Energy Implementation Plan to meet the 2030 and 2045 standards while ensuring equitable distribution of benefits and reducing burdens. This work and costs are additional to what PSE would have expended to implement the baseline portfolio in which WUTC did not mandate the clean energy standards.

Monitoring and Reporting

As part of implementing the Clean Energy Implementation Plan, PSE must collect and manage our progress toward interim and specific targets, actions, customer benefits. We will incur costs to track and report the information to the WUTC. We will include this information in the required annual clean energy program[49] and four-year compliance reports[50]. The measurement and reporting processes are to track progress against the targets and actions in the Clean Energy Implementation Plan, so the costs to maintain and report this data are incremental to what would have been required in the absence of the 2030 and 2045 targets.

Summary of Incremental Cost Projection

We summarize the incremental cost of the actions in this plan compared to the baseline portfolio below. We developed these incremental costs using the projection, allocation, and modeling methodologies described in this section and include detailed spreadsheets in Appendix E. Consistent with WAC 480-100-660(4), we compared the projected cost to PSE's projected weather-adjusted sales revenue.

[45] WAC 480-100-640(4)(c)
[46] WAC 480-100-655(2)
[47] WAC 480-100-655(2)
[48] WAC 480-100-655(3)
[49] WAC 480-100-650(3)
[50] WAC 480-100-650(1)

Table 5-2: Incremental Cost Summary

			2022	2023	2024	2025	2022–025 Incremental Cost	Percent Forecast
Estimated Incremental Cost Calculation ($000)								
Energy Efficiency								
Without 2030 and 2045 Requirements	662,048	MWh through 2025	$65,598	$65,598	$65,598	$65,598		
With 2030 and 2045 Requirements	967,994	MWh through 2025	$95,913	$95,913	$95,913	$95,913		
Incremental Cost			$30,314	$30,314	$30,314	$30,314	$121,258	27%
Demand Response								
Without 2030 and 2045 Requirements	7	MW by 2025	$100	$296	$365	$995		
With 2030 and 2045 Requirements	24	MW by 2025	$342	$1,018	$1,253	$3,416		
Incremental Cost			$242	$722	$888	$2,421	$4,273	1%
Energy Supply Portfolio								
Without 2030 and 2045 Requirements	1081	[a]MW in 2025	$561,772	$589,410	$587,661	$609,004		
With 2030 and 2045 Requirements	1316	[a]MW in 2025	$562,277	$606,707	$702,468	$705,443		
Incremental Cost			$505	$17,298	$114,807	$96,439	$229,048	51%
Technology and Enabling Costs for Distributed Energy Resources								
With 2030 and 2045 Requirements			$4,244	$10,917	$12,836	$22,962	$50,958	11%
Customer Education and Outreach								
With 2030 and 2045 Requirements			$960	$9,830	$10,215	$10,406	$31,410	7%
Administration and Reporting								
With 2030 and 2045 Requirements			$2,058	$2,110	$2,162	$2,216	$8,547	2%
Total Cost			**$665,793**	**$726,494**	**$824,847**	**$840,356**		
Total Incremental Cost Forecast			**$38,323**	**$71,190**	**$171,223**	**$164,759**	$445,495	100%

Calculation of Annual Threshold Amount

WAC 480-100-660 (2) specifies the means for identifying the annual threshold amount, which is used for determining eligibility for reliance on RCW 19.405.060(3) for compliance. WAC 480-100-660(4) requires a projection of this amount be filed in the CEIP.

The annual threshold amount is specified by rule as:

$$Annual\ Threshold\ Amount = \frac{(WASR_0 \times 2\% \times 4) + (WASR_1 \times 2\% \times 3) + (WASR_2 \times 2\% \times 2) + (WASR_3 \times 2\%)}{4}$$

For the purposes of projecting the annual threshold amount, we assume a baseline of adjusted electric sales from PSE's 2020 Commission Basis Report, which includes weather normalization. For the purposes of this projection, weather adjusted sales revenue is assumed to rise at an inflation rate of 2.5 percent per year. In addition, the incremental costs of CETA are assumed to increase that rise in the weather-adjusted sales revenue, which is included in the calculations in Appendix E.

Many factors affect weather adjusted sales revenue, including changes in sales volumes not due to weather, changes in wholesale energy markets typically reflected in PSE's annual PCA filing, changes in conservation costs, changes in tax rates, and other rate changes. PSE does not control these factors, so it is impossible to forecast weather adjusted sales revenue accurately. Tracking of actual costs and actual weather adjusted sales revenues will occur during the implementation period.

Comparison of Incremental Cost and Annual Threshold Amount

We summarize the incremental cost of the actions in this plan compared to the baseline portfolio below. We developed these incremental costs using the projection, allocation, and modeling methodologies described in this section and include detailed spreadsheets in Appendix E, Incremental Cost. Consistent with WAC 480-100-660(4), we compared the projected cost to PSE's projected weather-adjusted sales revenue.

Currently unquantified costs and benefits

Some costs and benefits of pursuing the 2030 and 2045 targets are not yet quantified. These are emerging or complicated areas. Specific areas of known costs and benefits that are not currently quantified include:

- Integration costs for high amounts of renewable energy
- Changes in reliability standards
- Changes in wholesale market design and regulation
- Updates to federal and state tax structures

As costs and benefits become more known, PSE will integrate these into planning and acquisition decisions.

Table 5-3 Calculation of Annual Threshold Amount and Comparison to Incremental Cost

		2021	2022	2023	2024	2025
Calculation of Estimated 2% in Weather Adjusted Sales Revenue						
PSE 2020 Retail Sales to Customers	$1,988,341					
Escalated at 2.5% per year	$0	$2,038.050	$2,089,001	$2,141,226	$2,194,757	$2,249,626
2% of Previous Year's Forecasted Weather Adjusted Retail Sales			$40,761	$41,780	$42,825	$43,895
Compounding Effect for CETA Incremental Cost			--	$766	$2,190	$5,615
Total 2% Increase Estimate, Including Compounding			$40,761	$42,546	$45,015	$49,510
Estimated 2% Annual Increase in Weather-Adjusted Sales Revenue			$40,761	$42,546	$45,015	$49,510
Cumulative Estimated 2% Annual Increase in Weather-Adjusted Sales Revenue			$40,761	$83,307	$128,322	$177,832
Comparison of Forecast Incremental Cost and Estimated 2% Increase in Weather Adjusted Sales Revenue						
Estimated Incremental Cost			**$38,323**	**$71,190**	**$171,223**	**$164,759**
Annual Comparison			**$(2,438)**	**$(12,118)**	**$42,901**	**$(13,073)**
Cumulative			**$(2,438)**	**$(14,556)**	**$28,345**	**$15,272**